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GUIDELINES FOR THE PREPARATION OF AN
ENVIRONMENTAL ANALYSIS OF ALTERNATIVES
FOR THE SOUTH YUKON TRANSPORTATION STUDY

ISSUED BY:

ENVIRONMENTAL ASSESSMENT PANEL
SOUTH YUKON TRANSPORTATION STUDY

F.G. HURTUBISE, CHAIRMAN

WYKES, G.E. JONES, J. HAWRYSZKO, M. DENNINGTON, W. BILAWICH

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GUIDELINES

FOR THE


PREPARATION OF

AN ENVIRONMENTAL ANALYSIS OF ALTERNATIVES

FOR THE

SOUTH YUKON TRANSPORTATION STUDY





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PREFACE

These guidelines apply to the first stage of a two-stage environmental impact assessment. Future transport requirements could be satisfied by:

- (a) the existing road system
- (b) a rail line along the existing road route
- (c) a rail line along a more southerly alignment
(Big Salmon route)
- (d) a new road along a more southerly alignment
(Big Salmon route).

The main purpose of the first stage is to determine whether the environmental impacts will be significantly different among the four alternatives. The second stage, a definitive impact assessment, will be carried out when a route is chosen based on financial, socio-economic, environmental and perhaps other considerations.

The proponent should recognize at the outset that while there is a considerable degree of detail contained in these guidelines--detail which would be relevant to any alternative--they need only be described in this stage to the extent compatible and relevant to route selection.

1. OVERVIEW SUMMARY

The overview summary should be written in such a manner as to allow reviewers to focus immediately on items of concern. It should be written in terms understandable to the general public and in a format that allows it to be extracted directly for publication by the media, or for use by those requiring a rapid appraisal of the situation.

The overview summary should briefly describe and compare the project alternatives, the probable significant environmental impacts, the ameliorating and mitigating measures to be implemented, and the significance of the residual environmental impacts following amelioration or mitigation. Any environmental aspects of the development which might stimulate public concern should be described with particular clarity. The summary should also clearly identify data gaps or knowledge deficiencies, and the limitations they have imposed on the study.

2. THE PROJECT SETTING

2.1 The need

The need for the proposed surface transport improvements should be outlined in terms of historic, present, and projected demands upon the existing system. Pertinent timing and routing factors associated with the demand should be discussed. The Initiator should also detail how the proposed action fits into existing and proposed land use plans and options.

State the forecast of ingoing and outcoming freight in terms of origin and destination as far as possible.

The existing transportation situation should be discussed in detail and should include the method of transportation, the number of vehicles, the origin and destination of vehicles, and current environmental problems.

2.2 Associated Projects

The relationship of the proposal to other existing or proposed projects should be outlined. This discussion should not be limited to transportation projects or only

to those projects controlled by the Initiator. This section should also identify the possible environmental concerns that might arise through the stimulated development of associated projects. The possibility of shared use of the rights-of-way should be discussed as well as other linear facilities that could be incorporated into a common corridor.

3. THE PROPOSAL

The alternatives should be discussed under each of the headings below as far as is feasible recognizing that there are not as yet detailed plans. The factors common to all alternatives may be discussed first, followed by a description of the factors peculiar to individual alternatives. Information on technical and cost constraints should be included.

3.1 General Layout

The proposed alternative routes and rights-of-way should be illustrated on topographic or photomosaic maps of suitable scale. The maps should also indicate existing and other proposed highways, railways, and associated transportation facilities, pipelines, work camps, and population centres. The Initiator should indicate the width of the right-of-way, and the locations of proposed bridges, tunnels, railway terminals, overpasses and underpasses. The degree of precision of this information should be explained.

3.2 Design and Construction Details

The Initiator should describe a construction scenario for the various alternatives using the following as general considerations:

- a) the methods and scheduling for the construction of the right-of-way, access roads, drainage structures and stream crossings;
- b) areas within which problems with permafrost may be anticipated and design methods to counteract such problems;
- c) erosion control measures: bank stabilization, rip-rap protection, drainage ditches, retention of wind-breaks, revegetation;
- d) the mileage and volumes of cuts, fills, and embankments, methods of their construction and stabilization procedures;
- e) gradients and degree of curvature to be used for railway lines;
- f) the extent of use, locations and boundaries of borrow sites including plans for use of borrow from, or adjacent to, watercourses, and the estimated required volumes of borrow material.
- g) the different designs of watercourse crossings (for seasonal and perennial streams) which will be used along the route and the criteria to be used in deciding the type of watercourse crossing;
- h) schedules of construction, relocations, and development of public facilities such as launching ramps, camp grounds, etc.;
- i) sizes and types of construction equipment;
- j) the housing requirements for the expected work force (temporary and permanent) involved in the project, including general areas in which construction camps would be required, size, waste disposal facilities (solid and liquid), fuel handling facilities;
- k) the width of right-of-way clearing and limits of grubbing and stripping operations;

- l) the methods and seasonal scheduling for the clearing, grubbing and stripping operations of borrow sites and method(s) of disposal of accumulated materials, e.g., timber slash, overburden, etc.;
- m) the sediment control measures and methods of controlling surface and subsurface drainage during operation of the borrow pits.

3.3 Operation and Maintenance

Describe timing and procedural details of:

- a) maintenance under normal conditions; types of expected maintenance;
- b) application of pesticides, including herbicides and of dust suppression chemicals; (description of chemicals and rates and methods of application);
- c) monitoring proposals and contingency plans to correct problems along the route;
- d) expected traffic volumes and characteristics of materials in each direction of flow;
- e) application of preservatives and rust inhibitors at stream crossings (description of chemicals and rates and methods of application).

3.4 Post Construction Abandonment and Rehabilitation

Describe the abandonment and rehabilitation procedures:

- a) life expectancy of the project;
- b) abandonment plans for temporary facilities (roads, rail lines, bridges and culverts);
- c) restoration of existing routes where they are abandoned as a result of reconstruction;

- d) closure, revegetation, and/or alternative use plans for the route and right-of-way when its useful life is terminated;
- e) restoration and abandonment plans for borrow sites.

4. DESCRIPTION OF EXISTING ENVIRONMENT AND RESOURCE USE

This section should describe the existing environment with emphasis being placed on the site specific, unique or sensitive environmental features that are of particular importance to the area and could be affected by the proposal. The right-of-way and surrounding areas should be considered. Field and literature research should be carried out. Knowledge gaps should be identified where they exist. The Initiator should include a qualitative and quantitative description of present resource use. Maps of appropriate scale should be utilized in each subsection to illustrate resource and environmental information. Sources of information should be referenced along with a description of the methods of determination.

Again in this section the proponent should recognize that the degree of detail presented in these guidelines is a reflection of requirements for a final stage EIS for a specific proposal. They need only be described in this stage to the extent relevant to route selection.

4.1 Climate

The location of the recording station(s) should be noted along with the historic climatic conditions that prevail in the vicinity of the proposed transportation corridor:

- a) long-term means and extremes of temperature, precipitation, wind speed and direction, average depths of snow cover throughout the year;
- b) the frequency and persistence of temperature inversions, fog, smoke, haze, freezing precipitation, thunderstorms and ice fog.
- c) delineation of precipitation induced avalanches and high wind zones or other special weather conditions.

4.2 Terrain

The information should be presented on maps of sufficiently large scale:

- a) topography (with contours), landforms, surficial geology, bedrock geology, major soil types and indication of presence or absence of permafrost (continuous/discontinuous);
- b) appropriate maps indicating material stability;
- c) recognized or anticipated areas of instability (subsidence, landslides, mudflows, snowslides, earthquake zones, etc.)
- d) special, sensitive, or unique geological or land-form features;
- e) identification and availability of borrow material.

4.3 Hydrology and Limnology

Describe important parameters of ground and surface waters:

- a) physical, chemical and biological parameters;
- b) quality, supply, present and proposed use of surface and ground waters;

- c) fluviological data: peak and minimum flow dates and levels, design discharge (i.e. 100 year flood), monthly mean discharges, historic channel movement;
- d) describe duration and extent of ice cover.

4.4 Vegetation

Describe the plant life in the corridor area:

- a) map biogeoclimatic zones and forest cover; describe forest stand structure, maturity;
- b) describe plant communities within the proposed corridor by species and common names; indicate relative abundance of species, importance to man, and importance to native fauna as habitat and food;
- c) identify undisturbed, rare or unique vegetation; plant life of special economic, historic, social or scenic value.

4.5 Fish and Wildlife

- a) Identify and determine the distribution of those species of fish, birds and mammals (including rare or endangered species) which continuously, seasonally, or occasionally occupy the areas which could be affected by the development. Priorities for more in-depth studies should be guided by established importance values for individual species, based upon population status and economic or social roles.
- b) Identify in follow-up studies as determined in (a), habitat components that are critical to the

maintenance of the species or population in question. These should include:

- i. significant fish migration routing and timing, locations of significant spawning beds, nursery areas and overwintering areas upstream and downstream from and at watercourse crossings or encroachments;
 - ii. significant waterfowl migration routes, staging, nesting, developmental and moulting areas, timing of arrival and departure from each location;
 - iii. areas critical to the life cycles of wildlife, migration pathways of big game animals, fur bearers, or other economically valuable, recreationally important or unique species.
 - iv. future habitat potential (e.g. salmonid enhancement) - (relate to Section 4.7(k).)
- c) Describe and quantify both consumptive and non-consumptive uses of wildlife and fishery resources, including:
- i. commercial, recreational, native and domestic fishing activities and catches;
 - ii. hunting activities and harvests;
 - iii. location of native food fishing sites.

4.6 People

Describe:

- a) the social, economic and cultural setting of the area;

- b) population distribution (including seasonal fluctuations if relevant), communities, employment, facilities and housing, within the area likely to be affected by the development;
- c) discuss the housing requirements for the expected work force (temporary and permanent) involved in the project;
- d) attitude of the local population toward the environmental consequences of the development.
- e) specifically identify the special interests of natives which may be affected by the development.

4.7 Land Resource Use

Describe the nature, extent and location of present and projected utilization of land and resources:

- a) agriculture: where applicable;
- b) forestry: raw material used, types of production;
- c) mining (both placer and hardrock): past sites, present claims or leases, areas presently being exploited or under feasibility study;
- d) wilderness and recreational: territorial or national parks, game preserves, ecological, scenic or unique vistas, and other recreational areas (e.g. camping, picnicing, sport fishing/hunting;
- e) hunting, fishing, trapping;
- f) urban: residential, commercial, industrial;
- g) existing archaeological and historic sites and artifacts to be protected or salvaged;
- h) ownerships: public, private, or special status;
- i) other linear developments;

- j) aesthetically special features;
- k) economic value of commercial and recreational fishing activities affected;
- l) future or expanded recreational use potential.

5. ENVIRONMENTAL IMPACTS AND MITIGATING MEASURES

The discussion should describe and compare the expected environmental impacts of the alternatives with emphasis on those actions which are likely to cause major environmental disruptions. Major impacts are to be identified as those of long or short-term that enhance, disrupt, impair or destroy existing features, conditions or processes in the natural environment; or cause enhancement of, or conflict with, established, traditional or historic land uses and ways of life; or affect the livelihood or health of segments of the human populations (deleterious as well as beneficial impacts); or significantly change the environmental options. This assessment should be made on the basis of information collected from existing sources supplemented by field data. Where factual data are unavailable or of questionable quality, the report should clearly state that the predicted effect(s) was based on subjective judgement and that knowledge gaps exist. Impacts should be considered for the pre-construction, construction, operation, and abandonment phases.

The impacts should be categorized as direct or indirect--those that arise directly from the proposed project, such as interruption of fish migration due to a stream crossing, and those that arise because of secondary activities induced by the project, such as increased fishing or hunting pressure following improved access to an area.

The description of potential environmental impacts should include, where appropriate, but not necessarily be restricted to, the topics identified in Appendix A. Options and measures available to avoid, minimize, or mitigate harmful effects or to enhance beneficial effects should be identified. General mitigation considerations might involve changes in route, design, scheduling, or operations.

6. RESIDUAL IMPACTS

Identify and quantify the environmental impacts that will remain after all mitigating measure have been implemented. For example:

- a) nature, extent, and duration of impacts;
- b) impacts resulting from increased access to wilderness areas, e.g., tourism, hunting and fishing pressure;
- c) the total residual environmental impacts expected from each alternative.

7. ANNEXES

The Annexes should include:

- 7.1 An annotated list of references cited.
- 7.2 Copies of reports developed from studies associated with the evaluation.
- 7.3 Summary of field data and copies of complete field data as well as methodology be made available.
- 7.4 Identification of critical information gaps and the limitation they have imposed on the study. Terms of reference to studies designed to resolve these deficiencies should be presented.

EXAMPLES OF POTENTIAL ENVIRONMENTAL IMPACTS
AND MITIGATING MEASURES

The following are examples of areas where environmental impacts may be anticipated. Some mitigative measures are suggested.

1. Terrain and Vegetation

- a) methods of handling potential problems arising from earthquakes, landslides, avalanches, and other mass movements;
- b) methods of minimizing disturbance of vegetation and the organic mat in permafrost, particularly in ice rich areas;
- c) methods of minimizing instability due to differential thaw or freezing, loss of ground strength and thermo-karst in permafrost areas;
- d) terrain stabilization and erosion control procedures, including: revegetation, diversion structures, and rip-rap and flood protection;
- e) plans for mining and borrow pit operations, including dimensions and volumes of excavations; location in relation to possible interactions with water bodies; methods of minimizing introduction of sediment or suspended solids to water bodies;
- f) borrow pit restoration - stabilization, revegetation, and disposition of surplus materials;

(continued on next page)

- i) plans for minimizing drainage disruption; extent of drainage disruption, where it is expected;
- j) impacts of cuts, fills and tunnels;
- k) plans to provide buffer zones of trees and natural vegetation adjacent to water bodies;
- l) plans to schedule clearing and actual transportation route construction so that long intervals of years do not occur between the two operations;
- m) methods of minimizing disturbance of topsoil and vegetation adjacent to water bodies or in sensitive areas;
- n) methods of clearing, grubbing and stripping adjacent to water bodies or in sensitive areas.

2. Stream, River and Lake Crossings

- a) Scheduling, location and design of watercourse crossings (temporary and permanent) and encroachments as related to safe upstream and downstream passage of fish;
- b) impact of crossings and encroachments on runoff, bank erosion, migration of stream channels, ice jams, icings, upstream ponding and streambed scouring;
- c) plans for fish passage structures when channel change or velocity barriers (e.g. at culverts) impede fish movement;
- d) design and scheduling of approaches to stream crossings and encroachments so as to maintain stability of valley walls and river banks and to minimize changes that could lead to slope failures, gullying, and related disturbances;
- e) methods of minimizing introduction of sediment or suspended solids to water bodies during and after construction;
- f) design and/or maintenance procedures to prevent the crossing from being clogged by floating debris or beaver dams;
- g) routing locations designed to avoid:

- watercourses in general
 - those regions frequented by fish
 - spawning beds
 - wet lands and marshes frequented by migratory birds
 - encroachment on the flood plain of watercourses;
- h) plans for the diversion or interruption of stream flows during construction.

3. Water Resources

- a) Probable effects on water supply sources and their use;
- b) dates and proposed methods of construction within 300 feet of any water body frequented by fish;
- c) interruption to stream flows and changes in lake levels;
- d) changes in groundwater hydrology and drainage patterns;
- e) plans to use borrow from streams or add fill near or in the floodplain of any watercourse;
- f) locations and volumes of water to be either removed or added to water bodies;
- g) locations of sewage outfalls and domestic supply intakes.

4. Fish and Wildlife

- a) Schedules of construction activities should demonstrate evidence that the project contains the flexibility to allow construction to be temporarily suspended during periods of inclement weather to avoid excessive siltation or when fish, wildlife, or waterfowl use of specified areas is essential and critical to their survival;

- b) impact of routing on traditional migration pathways: expected use of rail grade by migrating species (e.g. caribou); use of overpasses or deflection barriers to protect traditional pathways; possible delays in deflection of migration caused by the transportation system or attendant deflections barriers;
- c) animal collisions: measures to discourage animal use of the rail line; snow ploughing procedures that allow animals to leave the rail line when collision is imminent; train operation procedures which help avoid collision; procedures for removal of carcasses to avoid secondary collisions involving scavengers;
- d) plans for routing around or otherwise protecting sensitive areas for fish and wildlife such as breeding or staging grounds for waterfowl, big game, or fur-bearers and nursery, feeding and spawning grounds of fish;
- e) safeguards proposed for the habitats of rare or endangered species;
- f) methods of minimizing wildlife harassment, increased hunting pressure and overfishing;
- g) restoration of fish and wildlife habitats following construction.

5. Wastes, Toxins and Noise

- a) Methods of preventing sediment, slash, or other substances deleterious to aquatic life from entering water bodies;
- b) complete schedules and procedures of pesticide, including herbicide use; type and quantity of chemicals; their expected persistence, toxicity, and mobility in the environment;

- c) plans for treatment and disposal of solid wastes and sewage at work sites, camps, permanent wayside stops and maintenance depots provided to service the travelling public;
- d) anticipated noise problems and controls during construction and operation phases;
- e) plans for the control of any discharge from rolling stock;
- f) location and volumes of waste water to be added to natural water bodies;
- g) complete schedules and procedures of preservatives and rust inhibitors used at stream crossings; type and quantity of chemicals; their expected persistence, toxicity, and mobility in the environment;
- h) plans for servicing and fuelling of machinery and equipment to prevent spills of petroleum products into water bodies.

6. Land and Resource Use

- a) Impact on present and future land use where the transportation pathway passes through forested, mined, wilderness, residential, commercial, recreational, agricultural, private, or special status lands; details of relocations which may be required;
- b) temporary restrictions on land use during construction, effects on local traffic patterns;
- c) impact on aesthetic values of the landscape;
- d) surveys to identify archaeological, historic, and scenic sites prior to and during the construction phase; procedures designed for the preservation of such sites.

7. Contingency Plans

Discuss:

- a) derailment protection measures; provisions for the clean-up of accidental spills from rail cars or highway

tankers and from hazardous materials used during construction;

- b) procedures to repair the transportation pathway following land movements, floods, or destructive storms;
- c) methods of fire prevention and suppression along the route;
- d) procedures for removal of culvert blockages caused by icing, ice jams, or debris.

